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(54) **COIN HANDLING APPARATUS**

MÜNZHANDHABUNGSVORRICHTUNG

APPAREIL DE MANIPULATION DE PIÈCES DE MONNAIE

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a coin handling apparatus that handles coins.

Description of the Background Art

[0002] Conventionally, coin handling apparatuses that perform depositing and dispensing of coins have been used. Japanese Laid-Open Patent Publication No. 2013-122744 discloses a coin handling apparatus that stores coins in a plurality of storage units for each denomination. The apparatus sorts coins by using a transport path on which coins are transported. A plurality of inlets are provided in the transport path so as to correspond to the plurality of storage units. A gate is disposed at each inlet. Coins transported on the transport path can pass over the closed gate. When the gate is opened, coins are dropped into the storage unit from the inlet. By opening the gates corresponding to the denominations of coins, the coins are stored in the storage units for each denomination.JP 2011 039593A discloses a money handling device which performs a predetermined transaction for a user based on money includes: an accepting unit for accepting money; a conveying unit for conveying money from an upstream section to convey the money accepted to a plurality of downstream sections to receive the money; a plurality of switching units provided at the conveying unit for switching the money conveying direction from the upstream section to either of the downstream sections; and a control unit which operates the switching units from the upstream side to the downstream side to switch the money conveying direction. EP 1808822 A1 discloses a coin processing device including a passage having openings. A coin is dropped through the openings by using gates. EP 1927955A1 discloses a compact coin depositing and dispensing machine comprising a conveying means for conveying, one by one, coins, accepted in a coin acceptance port, in a depositing and conveying direction, and conveying, one by one, coins, to be ejected to a coin ejection port, in a dispensing and conveying direction reverse the depositing and conveying direction. A plurality of accommodating and ejecting units are disposed along the conveying means. At positions of a coin passage at the respective coin outlet/inlets are disposed sorting members that selectively sort coins according to whether a coin is to be output or input through the respective coin outlet/inlets or whether a coin being conveyed by the conveying means is to be passed to a downstream side in the conveying direction. The sorting member has, in an integral manner, a coin guiding portion, guiding a coin to the coin outlet/inlet, a closing portion, preventing the entry of a coin into the coin outlet/inlet, and a supporting portion, swingably supporting the coin guiding portion and the closing portion. US 4615350A discloses a coin dispensing device having a ejector member opposite a coin runner.

SUMMARY OF THE INVENTION

[0003] In the conventional art described above, however, coins cannot be correctly sorted in some cases. For example, there is a possibility that the gates cannot be opened and closed in time when a transport speed of coins is high. By changing the shape of each gate into a shape for closing only a part of the opening of the inlet to reduce the weight of the gate, the opening/closing speed of the gate can be increased. In this case, however, even in a state where the gate is closed, a small-diameter coin may be dropped through a gap in the gate into the opening.

[0004] The present invention has been made in view of the problem in the conventional art described above, and an object of the present invention is to provide a coin handling apparatus that can drop a coin to be dropped, into an opening formed in a transport path.

[0005] A coin handling apparatus according to one aspect of the present invention is provided in claim 1.

[0006] The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

FIGS. 1A and 1B illustrate a coin handling apparatus according to an embodiment;
FIG. 2 shows schematic diagrams illustrating a state where a gate is closed;
FIG. 3 shows schematic diagrams illustrating a state where the gate is opened;
FIG. 4 illustrates an example of a guide member that guides transport pins;
FIGS. 5A and 5B illustrate an example of the gate;
FIGS. 6A to 6C are schematic diagrams for describing an opening and closing operation of the gate by a link mechanism;
FIGS. 7A and 7B are schematic diagrams illustrating an example in which the shapes of a first member and a second member shown in FIGS. 5A and 5B are different;
FIGS. 8A and 8B each show schematic diagrams illustrating a coin handling apparatus which is not within the scope of the present invention in which the opening and closing operation of the gate is different;
FIG. 9 shows schematic diagrams illustrating still another coin handling apparatus which is not within the

scope of the present invention in which the opening and closing operation of the gate is different;
FIGS. 10A and 10B show schematic diagrams illustrating a coin handling apparatus which is not within the scope of the present invention in which the gate includes a plurality of types of members having different opening and closing operations; and
FIGS. 11A to 11D show schematic diagrams illustrating a coin handling apparatus which is not within the scope of the present invention having a gate including three or more members.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] Hereinafter, an embodiment of the coin handling apparatus according to the present invention will be described with reference to the accompanying drawings. FIGS. 1A and 1B illustrate a coin handling apparatus 1 according to the present embodiment. FIG. 1A is an external view of the coin handling apparatus 1. FIG. 1B is a schematic diagram illustrating the internal structure of the coin handling apparatus 1.

[0009] As shown in FIG. 1A, the coin handling apparatus 1 includes a depositing unit 110 for depositing coins, and a dispensing unit 120 for dispensing coins. The depositing unit 110 is formed on an upper surface of the coin handling apparatus 1. The dispensing unit 120 is formed on a front surface of the coin handling apparatus 1. In addition to the depositing unit 110 and the dispensing unit 120, the coin handling apparatus 1 includes a cassette 130, storage units 140, a transport unit 150 (150a, 150b), a recognition unit 170, and a feeding unit 180 as shown in FIG. 1B.

[0010] When depositing coins to the coin handling apparatus 1, the depositing unit 110 receives the coins. The coins received by the depositing unit 110 are dropped into the feeding unit 180. The feeding unit 180 stores the dropped coins and feeds out the stored coins one by one to a transport path constituting the transport unit 150a. The transport unit 150a transports the coins fed out by the feeding unit 180, along the transport path. The recognition unit 170 recognizes and counts the coins transported on the transport path. For example, the recognition unit 170 recognizes denominations, authenticity, and fitness of the coins. The recognition unit 170 counts the number and the monetary amount of the coins for each denomination, and counts the total number and the total monetary amount of the coins. A destination to store each coin is determined on the basis of the result of recognition by the recognition unit 170.

[0011] A plurality of chutes 160 are connected to the transport path. The chutes 160 are disposed on the transport path downstream of the recognition unit 170 in a transport direction. Each chute 160 connects the transport path to any one of the cassette 130 and the storage units 140. FIG. 1B shows some chutes to avoid complexity. An opening of each chute 160 that is formed in the transport path is normally closed by a gate. Coins being transported on the transport path passes over the closed gate. When the gate at the chute 160 corresponding to the destination to store a coin is opened, the coin is dropped into the chute 160 through the opening in the transport path. The dropped coin is stored in the cassette 130 or the storage unit 140 through the chute 160. For example, coins to be collected from the coin handling apparatus 1 are stored in the cassette 130, and coins to be deposited in the coin handling apparatus 1 are stored in the storage units 140 for each denomination. The gate will be described later.

[0012] When dispensing coins from the coin handling apparatus 1, the storage units 140 feed out coins to be dispensed, one by one. A transport path constituting the transport unit 150b is disposed below the storage units 140. The coins fed out from the storage units 140 are dropped onto the transport path of the transport unit 150b. The transport path is provided so as to receive coins fed out from all the storage units 140 and transport the received coins to the feeding unit 180.

[0013] The transport unit 150b transports coins received on the transport path below the storage units 140, toward the front side (the left side in FIG. 1B) of the apparatus, and then transports the coins upward. The coins transported upward are dropped into the feeding unit 180. By opening a gate at a bottom surface of the feeding unit 180, the coins dropped into the feeding unit 180 are dispensed from the dispensing unit 120. The coins discharged to the dispensing unit 120 can be taken out through an opening in the front surface of the coin handling apparatus 1.

[0014] The cassette 130 is detachably mounted to the coin handling apparatus 1. The cassette 130 stores coins dropped from the chutes 160 and feeds out the stored coins. Coins fed out from the cassette 130 are dropped onto the transport path of the transport unit 150b, similar to coins fed out from the storage units 140. For example, the cassette 130 is used for collection of and replenishing with coins.

[0015] Next, the gate will be described. FIG. 2 shows schematic diagrams illustrating a state where the gate is closed. FIG. 3 shows schematic diagrams illustrating a state where the gate is opened. The upper diagrams of FIG. 2 and FIG. 3 each show a view of a transport surface of a transport path 30 as viewed from a Z-axis positive direction side with a direction perpendicular to the transport surface being defined as a Z axis. The lower diagrams of FIG. 2 and FIG. 3 each show the transport path 30 as viewed from a Y-axis negative direction side when the width direction of the transport path 30 being defined as a Y axis. In FIG. 2 and the subsequent figures, the coordinate axes are shown such that the correspondence between each figure can be understood.

[0016] As shown by an arrow in FIG. 2, a coin 100 is transported on the transport path 30 in an X-axis negative direction (transport direction). The coin 100 is transported in a state where the coin surfaces is parallel to the transport surface of the transport path 30. A transport belt 40

is disposed along the transport path 30, above the transport path 30 (in the Z-axis positive direction). A plurality of transport pins 41 are mounted on the transport belt 40 at equal intervals. By the transport unit 150a driving the transport belt 40 in the transport direction, the transport pins 41 move in the transport direction. The moving transport pin 41 pushes the coin 100 from the rear side (from the upstream side in the transport direction), whereby the coin 100 is transported in the transport direction.

[0017] Openings connected to the chutes 160 are formed in the transport surface of the transport path 30. Each opening has a rectangular shape. A gate for closing and opening the opening is disposed at each opening. The gate includes a first member 11 disposed upstream in the transport direction, and a second member 12 disposed downstream in the transport direction.

[0018] When the gate is in a closed position where the gate is closed as shown in FIG. 2, the upper surface of the first member 11 and the upper surface of the second member 12 form a flat surface that is substantially flush with the transport surface of the transport path 30. That is, the first member 11 and the second member 12 form a part of the transport surface on which coins are transported. The coin 100 pushed by the transport pin 41 passes over the upper surfaces of the first member 11 and the second member 12 in the closed position and is transported further downstream along the transport path 30.

[0019] Side walls 30a and 30b are disposed at both sides in the width direction (Y axis direction) of the transport path 30, respectively. Movement of coins in the transport path width direction is restricted by the side wall 30a and the side wall 30b. The dimension and the positional relationship of each component are set such that all coins of a plurality of denominations having different diameters can be transported along the transport path 30 between the side wall 30a and the side wall 30b.

[0020] For example, in the case where the transport path 30 is provided so as to be inclined such that the side wall 30a side is higher in the vertical direction than the side wall 30b side, the coin 100 is transported in a state where the coin 100 is shifted to the side wall 30b. When the diameter of a coin having a maximum diameter is denoted by D and the diameter of a coin having a minimum diameter is denoted by d among coins transported on the transport path, the width w1 of the transport path 30 shown in FIG. 2 is set to a value larger than the maximum coin diameter D (w1>D). The distance w2 between the transport pin 41 and the side wall 30b is set to a value smaller than the minimum coin diameter d (w2<d).

[0021] On the transport path 30, a sensor 50 for detecting the coin 100 is disposed upstream of the opening of the chute 160 in the transport direction. The coin handling apparatus 1 uses the sensor 50 to detect the coming of the coin 100 to be dropped. In accordance with the coming of the coin 100 to be stored in the cassette 130 or the storage unit 140, the coin handling apparatus 1 rotates the first member 11 and the second member 12 from the closed position shown in FIG. 2 to an opened position shown in FIG. 3 to open the gate. When the gate is opened, the coin 100 is dropped into the chute 160 through the opening as shown in FIG. 3. The dropped coin 100 is stored in the cassette 130 or the storage unit 140. After the coin 100 is dropped, the coin handling apparatus 1 closes the gate again.

[0022] The second member 12 includes two claws 12a and 12b. As shown in FIG. 2, the gap a between the claw 12a and the claw 12b is wider than the length b in the transport path width direction of the transport pin 41 (a>b). The first member 11 includes a claw 11a. As shown in FIG. 2, the claw 11a is located between the two claws 12a and 12b of the second member 12 when the gate is in the closed position. When the gate is in the closed position, the claw 11a of the first member 11 and the claws 12a and 12b of the second member 12 close the opening of the chute 160. The three claws 11a, 12a, and 12b close substantially the entire area of the opening.

[0023] The first member 11 is rotatably supported at an end portion thereof on the upstream side in the transport direction by a shaft 11b. The shaft 11b is disposed on the upstream side in the transport direction within the opening such that the axial direction thereof coincides with a direction (Y axis direction) perpendicular to the transport direction. As shown in FIG. 2, a planar shape of the first member 11 as viewed from above is a T-shape in which the claw 11a having a substantially rectangular thin plate shape extends downstream in the transport direction from a tubular main body through which the shaft 11b is inserted.

[0024] The second member 12 is rotatably supported at an end portion thereof on the downstream side in the transport direction by a shaft 12c. The shaft 12c is disposed on the downstream side in the transport direction within the opening such that the axial direction thereof coincides with the direction (Y axis direction) perpendicular to the transport direction. As shown in FIG. 2, a planar shape of the second member 12 as viewed from above is a U-shape in which the two claws 12a and 12b each having a substantially rectangular thin plate shape extend parallel to each other upstream in the transport direction from a tubular main body through which the shaft 12c is inserted.

[0025] The first member 11 and the second member 12 rotate between the closed position shown in FIG. 2 and the opened position shown in FIG. 3. As shown by an arrow in the lower diagram of FIG. 3, the first member 11 rotates around the shaft 11b from the closed position to the opened position at the lower side. By the rotation, the claw 11a moves to the lower side of the transport surface. The second member 12 rotates around the shaft 12c from the closed position to the opened position at the upper side. By the rotation, the claws 12a and 12b move to the upper side of the transport surface. The lower side is a Z-axis negative direction. Specifically, in the direction perpendicular to the transport surface, the lower side is the direction toward the inner side of the coin handling apparatus 1 with respect to the transport surface.

The upper side is the Z-axis positive direction. Specifically, in the direction perpendicular to the transport surface, the upper side is the direction toward the outer side of the coin handling apparatus 1 with respect to the transport surface.

[0026] As shown in FIG. 3, the second member 12 rotates to a position at which the ends, on the upstream side in the transport direction, of the claws 12a and 12b become higher than the lower end of the transport pin 41 and the lower end of the transport belt 40. At this position, the transport belt 40 and the transport pin 41 pass between the claw 12a and the claw 12b of the second member 12. That is, the second member 12 has a shape in which a part thereof on the upstream side in the transport direction is cut out such that the transport belt 40 and the transport pin 41 can pass therethrough when the second member 12 is at the opened position. When the gate is closed, the claw 11a of the first member 11, which is disposed so as to oppose the second member 12, closes the cut-out area of the second member 12 such that coins are not dropped through this cut-out area. While opening the gate, the first member 11 rotates downward as the second member 12 rotates upward, such that the claw 11a does not prevent a coin from being dropped.

[0027] A distance c shown in the lower diagram of FIG. 3 indicates the distance from the center of the shaft 11b of the first member 11 to a position at which the coin 100 collides against the lower surface of the second member 12 of the opened position when the coin 100 moves straight along the transport surface. The distance c is set so as to be larger than half the diameter D of the coin having a maximum diameter (c>(D/2)). Thus, before the leading end, in the transport direction, of the coin 100 collides against the second member 12, more than half of the lower surface of the coin 100 loses support by the transport surface, so that the leading end moves downward and the coin 100 is dropped into the chute 160.

[0028] When the coin 100 is transported at a high speed, the inertial force acting on the coin 100 is increased, so that the coin 100 may move in the transport direction even after the support of the lower coin surface is lost. In this case, the coin 100 collides against the lower surface of the second member 12 of the opened position and is dropped. That is, the second member 12 rotates to the opened position at which at least a part thereof is higher than the coin 100 on the transport surface, and functions as an obstacle that prevents passage of the coin 100. Because of both the function of the second member 12 as an obstacle and the influence of gravity, the direction of movement of the coin 100 is changed. The second member 12 functions as an obstacle for the coin 100 that is to move past the opening, and thus the coin 100 is reliably dropped into the chute 160.

[0029] The coin handling apparatus 1 includes a guide member 62 that guides the transport pins 41. FIG. 4 illustrates an example of the guide member 62. FIG. 4 shows a view of the transport path 30 as viewed from the downstream side in the transport direction (from the X-axis negative direction side). The position of the guide member 62 is fixed with respect to the transport path 30. For example, as shown in FIG. 4, the guide member 62 is fixed to a member 61 on which the transport path 30 is formed. The guide member 62 extends along the transport belt 40 and guides the transport pins 41 over substantially the entire area of the transport path 30.

[0030] As shown in FIG. 4, a cross-sectional shape of each transport pin 41, which is mounted on the transport belt 40, is a T-shape including a vertical portion 41a and a horizontal portion 41b. A groove is formed on the guide member 62 so as to correspond to the vertical portion 41a of the transport pin 41. The vertical portion 41a of the transport pin 41 moves while being guided by the groove, and the horizontal portion 41b located outside the groove pushes a coin. Movement of the transport pin 41 in the transport path width direction (Y axis direction) and the upward direction (Z-axis positive direction) is restricted by the groove of the guide member 62. The distance between the lower surface of the transport pin 41 and the transport surface of the transport path 30 is set to a value smaller than the thickness of a coin having a minimum thickness among coins to be handled. For example, the distance is set to 0.3 to 0.5 mm. Owing to the restriction by the guide member 62, the transport pin 41 does not move in the transport path width direction nor does it move in the up-down direction. Accordingly, transport of coins on the transport path 30 and dropping of coins from the transport path 30 into the chutes 160 are reliably performed.

[0031] Next, a specific example of the gate will be described. FIGS. 5A and 5B illustrate an example of the gate. FIG. 5A illustrates a state where the gate is closed, and FIG. 5B illustrates a state where the gate is opened. An arrow shown in FIG. 5A indicates the transport direction of coins, and a broken line shown in FIG. 5A indicates a position on which the transport belt 40 and the transport pins 41 pass. When a second member 22 has rotated upward to open the gate as shown in FIG. 5B, the transport belt 40 and the transport pin 41 pass between a claw 22a and a claw 22b.

[0032] Similar to the gate shown in FIG. 2 and FIG. 3, the gate shown in FIGS. 5A and 5B closes and opens the opening formed in the transport surface by using two members that are a first member 21 and the second member 22. Whereas the first member 11 shown in FIG. 2 and FIG. 3 includes one claw 11a, the first member 21 shown in FIGS. 5A and 5B includes two claws 21a and 21b. The structure shown in FIGS. 5A and 5B is realized by reducing the width, in the transport path width direction, of the claw 12b of the second member 12 shown in FIG. 2 and FIG. 3 and adding the claw of the first member 11 to the width-reduced area. When the first member 21 and the second member 22 are in a closed position shown in FIG. 5A, substantially the entire area of the opening formed in the transport path 30 is closed by the claws 21a and 21b of the first member 21 and the claws 22a and 22b of the second member 22.

[0033] The gate shown in FIGS. 5A and 5B includes a link mechanism that connects the first member 21 and the second member 22. The first member 21 and the second member 22, which are connected to each other by the link mechanism, move in conjunction with each other. The link mechanism is constituted by connecting plates including three plates 71, 72, and 74 each having an I-shaped thin plate shape, and one plate 73 having an L-shaped thin plate shape.

[0034] As shown in FIG. 5A, the second member 22 includes: a main body through which a shaft 22c is inserted; and the two claws 22a and 22b that extend onto a shaft 21c of the first member 21 from the main body. When the second member 22 rotates from the closed position shown in FIG. 5A to the opened position shown in FIG. 5B and returns to the closed position, the tips of the claws 22a and 22b come into contact with the shaft 21c of the first member 21 and the second member 22 stops.

[0035] The shaft 22c is fixed to the main body of the second member 22. The plate 71 is fixed to the shaft 22c. An axial direction of the shaft 22c coincides with the direction (Y axis direction) perpendicular to the transport direction. The shaft 22c is rotatably supported at both ends thereof. When the shaft 22c rotates, the second member 22 and the plate 71 rotate together with the shaft 22c.

[0036] The plate 71 is fixed at one end side thereof to the shaft 22c and rotatably connected at another end side thereof to the plate 72 by a shaft 81. The plate 72 is connected at one end side thereof to the plate 71 and rotatably connected at another end side thereof to the plate 73 by a shaft 82. The L-shaped plate 73 is connected at a corner of the L shape thereof to the plate 72. The plate 73 is rotatably supported at one end side thereof by a shaft 83 and rotatably connected at another end side thereof to the plate 74 by a shaft 84. The plate 74 is connected at one end side thereof to the plate 73 and rotatably connected at another end side thereof to a shaft 85. The axial directions of the shafts 81 to 85 coincide with the direction (Y axis direction) perpendicular to the transport direction.

[0037] The first member 21 includes: a main body through which the shaft 21c is inserted; and the two claws 21a and 21b that extend from the main body toward the downstream side in the transport direction. The shaft 21c is fixed to the main body of the first member 21. An axial direction of the shaft 21c coincides with the direction (Y axis direction) perpendicular to the transport direction. The shaft 21c is rotatably supported at both ends thereof. The first member 21 includes the shaft 85 at a position away from the shaft 21c on the downstream side in the transport direction (on the X-axis negative direction side). The shaft 85 is fixed to the claw 21b of the first member 21. When the shaft 85 is pulled downward, the first member 21 rotates downward around the shaft 21c.

[0038] A plate 75 is fixed at one end side thereof to the shaft 21c and fixed at another end side thereof to the shaft 85. A positioning member that is not shown is disposed outside the transport path 30 so as to correspond to the position of the plate 75. The positioning member is fixed at a position at which the lower surface thereof is in contact with the upper surface of the plate 75 of the closed position shown in FIG. 5A. When the first member 21 rotates from the closed position shown in FIG. 5A to the opened position shown in FIG. 5B and returns to the closed position, the upper surface of the plate 75 comes into contact with the lower surface of the positioning member and the first member 21 stops. At this time, a part of the upper surface of the claw 21b of the first member 21 also comes into contact with the lower surface of the positioning member. The method for stopping the first member 21 at the closed position is not limited to the described method. For example, only the plate 75 may be brought into contact with the positioning member, or only a part of the upper surface of the first member 21 may be brought into contact with the positioning member.

[0039] When a driving unit that is not shown rotationally drives one member of the first member 21 and the second member 22, the other member connected by the link mechanism also rotates in conjunction with the one member. An example of an operation of the first member 21 and the second member 22 will be described with the case where the driving unit rotationally drives the shaft 22c of the second member 22.

[0040] FIGS. 6A to 6C are schematic diagrams for describing an opening and closing operation of the gate by the link mechanism. FIG. 6A illustrates a state where the gate is closed, that is, a state where the first member 21 and the second member 22 are in the closed position. FIG. 6C illustrates a state where the gate is opened, that is, a state where the first member 21 and the second member 22 are in the opened position. FIG. 6B illustrates a state in the middle of opening of the gate, that is, a state in the middle of movement of the first member 21 and the second member 22 from the closed position to the opened position. The positions of the shaft 21c, the shaft 22c, and the shaft 83 are fixed.

[0041] As shown in FIG. 6A, in the closed position where the gate is closed, the upper surfaces of the first member 21 and the second member 22 form a flat surface that is substantially flush with the transport surface of the transport path 30. A coin being transported on the transport path 30 passes over the first member 21 and the second member 22 and is transported further downstream in the transport direction.

[0042] While opening the gate, the shaft 22c shown in FIG. 6A is driven to rotate clockwise. While closing the gate, the shaft 22c shown in FIG. 6C is driven to rotate counterclockwise. The driving unit that is not shown rotates the shaft 22c between the closed position shown in FIG. 6A and the opened position shown in FIG. 6C. That is, the driving unit rotates the second member 22 between the closed position and the opened position. For example, a rotary solenoid (swing selector) is used as the driving unit. The rotary solenoid is just one example

of a drive motor that could be used to control movement of the gate. Other electromechanical devices may be employed to control the opening and closing of the gate.

[0043] The second member 12 starts rotating from the closed position to the opened position with rotation of the shaft 22c as shown by an arrow in FIG. 6B. The plate 71, which is fixed at one end thereof to the shaft 22c, rotates clockwise. By the rotation of the plate 71, the position of the plate 72 moves to the upstream side in the transport direction (the left side in FIGS. 6A to 6C). The L-shaped plate 73, which is supported by the shaft 83, is pushed at the corner of the L shape thereof by the plate 72 to rotate counterclockwise. By the rotation of the plate 73, the plate 74 moves downward while rotating. The first member 21 starts rotating from the closed position to the opened position with the downward movement of the plate 74.

[0044] The first member 21 and the second member 22 that have started rotating as shown in FIG. 6B stop at a maximum position in a preset operating range of the driving unit. This position is the opened position at which the first member 21 and the second member 22 stop. FIG. 6C illustrates the first member 21 and the second member 22 in the opened position. The link mechanism, which causes the first member 21 and the second member 22 to move in conjunction with each other, is formed such that a rotation angle f1 of the first member 21 shown in FIG. 6C is larger than a rotation angle f2 of the second member 22. As a result, in the opened position, the gap between the first member 21 and the second member 22 is larger on the downstream side than on the upstream side in the transport direction.

[0045] While opening the gate, the claws 22a and 22b of the second member 22 disposed to support, from below, a coin being transported on the transport path 30 move to the opened position. In the opened position, the claws 22a and 22b are located above the coin and the coin is supported only by the first member 21. A small-diameter coin has a small area of contact with the first member 21, and thus the lower coin surface the support of which has been lost easily moves downward and the coin surfaces stand up. In the case where a position at which the gap between the upper surface of the first member 21 and the lower surface of the second member 22 is narrow and the upper surface of the first member 21 and the lower surface of the second member 22 are substantially parallel to each other as shown in FIG. 6B is set as the opened position, the gap may be clogged with a standing small-diameter coin. Thus, the angles f1 and f2 are set such that clogging with a standing small-diameter coin is prevented. For example, the angles f1 and f2 are set such that, even at a position at which the gap between the upper surface of the first member 21 and the lower surface of the second member 22 at the opened position shown in FIG. 6C is the narrowest, the gap is larger than the minimum diameter d of the coin having a minimum diameter.

[0046] In order to drop a coin into the chute 160, it is preferable that the first member 21 greatly rotates downward. On the other hand, it is sufficient that the second member 22 rotates upward to a position at which the second member 22 prevents passage of a coin transported thereto on the transport path 30. Thus, the angles f1 and f2 are set such that the gap between the first member 21 and the second member 22 becomes wide and the rotation angle f1 of the first member 21 is larger than the rotation angle f2 of the second member 22. For example, the link mechanism is formed such that: the angle f1 by which the first member 21 rotates from the closed position to the opened position is about 65 degrees; and the angle f2 by which the second member 22 rotates from the closed position to the opened position is about 20 degrees.

[0047] After the gate has been opened and a coin has been dropped into the chute 160, the driving unit drives the shaft 22c shown in FIG. 6C to rotate counterclockwise in order to close the gate. When the shaft 22c rotates counterclockwise, the respective plates 71 to 74, which form the link mechanism, move in directions opposite to those when the gate is opened. As a result, the first member 21 and the second member 22 return from the opened position shown in FIG. 6C through the intermediate state shown in FIG. 6B to the closed position shown in FIG. 6A to close the gate.

[0048] The structure of the gate is not limited to the above-described examples. FIGS. 7A and 7B are schematic diagrams illustrating an example in which the shapes of the first member and the second member shown in FIGS. 5A and 5B are different. FIG. 7A illustrates a state where the gate is closed, and FIG. 7B illustrates a state where the gate is opened. An arrow shown in FIG. 7A indicates the transport direction of coins transported on the transport path 30, and a broken line in FIG. 7A indicates a position on which the transport belt 40 and the transport pins 41 pass.

[0049] The present embodiment is not limited to the above described examples in which substantially the entire area of the opening formed in the transport path 30 is closed when the gate is closed as shown in FIG. 2 and FIG. 5A. In another example, a part of the opening is not closed and a gap is left as shown in FIG. 7A. It is allowable that a gap leading to the chute 160 is left between a first member 31 and a second member 32 in the closed position as long as coins transported on the transport path 30 are not dropped through the gap when the gate is being closed.

[0050] The number of members forming the gate and the opening and closing operation of the gate are not limited to the above-described examples. FIGS. 8A and 8B each show schematic diagrams illustrating a coin handling apparatus which is not within the scope of the present invention in which the opening and closing operation of the gate is different. The upper diagrams of FIGS. 8A and 8B each illustrate a state where the gate is closed by a plurality of members 201 and 202 in a closed position, and the lower diagrams of FIGS. 8A and

8B each illustrate the respective members 201 and 202 that move to an opened position to open the gate.

[0051] The gate shown in FIG. 8A includes the members 201 and 202 that are disposed so as to be slidable. The two members 201 and 202, which close the opening of the chute 160 as shown in the upper diagram of FIG. 8A, move in parallel to both outer sides in the transport path width direction, respectively, as shown in the lower diagram of FIG. 8A to open the opening.

[0052] The members 201 and 202 shown in the upper diagram of FIG. 8A may be rotatably supported by the side walls 30a and 30b of the transport path 30 as shown in the upper diagram of FIG. 8B. The opening of the chute 160 can be opened by rotating the two members 201 and 202 downward as shown in the lower diagram of FIG. 8B.

[0053] FIG. 9 shows schematic diagrams illustrating still another coin handling apparatus which is not within the scope of the present invention in which the opening and closing operation of the gate is different. The upper diagram of FIG. 9 illustrates a state where the gate is closed by a plurality of members 211 and 212 in a closed position, and the lower diagram of FIG. 9 illustrates the respective members 211 and 212 that move to an opened position to open the gate.

[0054] The gate shown in FIG. 9 includes the members 211 and 212 that are disposed so as to be rotatable to the outer side in the transport path width direction. The two members 211 and 212, which close the opening of the chute 160 as shown in the upper diagram of FIG. 9, rotate around shafts 211a and 212a, respectively, to the outside of the transport path as shown in the lower diagram of FIG. 9 to open the opening. The shafts 211a and 212a are disposed downstream of the members 211 and 212 in the transport direction. Alternatively, the shafts 211a and 212a are disposed upstream of the members 211 and 212 in the transport direction.

[0055] FIGS. 10A and 10B show schematic diagrams illustrating a coin handling apparatus which is not within the scope of the present invention in which the gate includes a plurality of types of members having different opening and closing operations. FIG. 10A illustrates a state where the gate is closed by a plurality of members 221 and 222 in a closed position, and FIG. 10B illustrates the respective members 221 and 222 that move to an opened position to open the gate. The upper diagrams of FIGS. 10A and 10B each show a view of the transport path 30 as viewed from above, and the lower diagrams of FIGS. 10A and 10B each show a view of the transport path 30 as viewed from a lateral side.

[0056] An arrow shown in FIG. 10A indicates the transport direction of coins. The gate includes the first member 221 and the second member 222. The first member 221 slides and is retracted below the transport surface. The second member 222 rotates upward from the transport surface like the second members 12 and 22 shown in FIG. 2 and FIGS. 5A and 5B.

[0057] The second member 222 has a thin plate shape including a recessed part obtained by cutting out a part thereof on the upstream side in the transport direction. When the second member 222 rotates upward to open the gate, the transport belt 40 and the transport pins 41 pass through the recessed part cut out from the second member 222. The first member 221 has a thin plate shape including a projected part formed so as to correspond to the recessed part of the second member 222. When the gate is closed, the recessed part of the second member 222 is closed by the projected part of the second member 222. Substantially the entire area of the opening of the chute 160 can be closed by the first member 221 and the second member 222.

[0058] As shown in FIG. 10B, while opening the gate, whereas the first member 221 slides to the upstream side in the transport direction, the second member 222 rotates upward.

[0059] FIGS. 11A to 11D are schematic diagrams illustrating coin handling apparatus which is not within the scope of the present invention and comprises gates including three or more members. FIG. 11A shows a view of the transport path 30, as viewed from above, in a state where the gate is closed by a plurality of members 231 to 233 in a closed position. An arrow in FIG. 11A indicates the transport direction of coins. The first member 231 and the second member 232 are rotatably supported by the side walls 30a and 30b of the transport path 30, respectively. Similar to the second members 12 and 22 shown in FIG. 2 and FIGS. 5A and 5B, the third member 233 is disposed so as to be rotatable upward from the transport surface.

[0060] The third member 233 has a thin plate shape including a recessed part obtained by cutting out a part thereof on the upstream side in the transport direction. When the third member 233 rotates upward to open the gate, the transport belt 40 and the transport pins 41 pass through the recessed part cut out from the third member 233. The first member 231 and the second member 232 each have a thin plate shape including a projected part formed on the downstream side in the transport direction so as to correspond to the recessed part of the third member 233. When the gate is closed, the recessed part of the third member 233 is closed by the projected part of the first member 231 and the projected part of the second member 232. Substantially the entire area of the opening of the chute 160 can be closed by the first member 231, the second member 232, and the third member 233.

[0061] The upper diagram of FIG. 11B shows a view of the third member 233 in the closed position as viewed from a lateral side of the transport path 30. The lower diagram of FIG. 11B illustrates the third member 233 that rotates to an opened position. The upper diagram of FIG. 11C shows a view of the first member 231 and the second member 232 in the closed position as viewed from the downstream side in the transport direction The lower diagram of FIG. 11C illustrates the first member 231 and the second member 232 that rotate to the opened position. While opening the gate, the third member 233 rotates upward as shown in FIG. 11B, and the first member

231 and the second member 232 rotate downward as shown in FIG. 11C.

[0062] FIG. 11D illustrates an example in which the third member 233 shown in FIG. 11A is divided into two members 241 and 242. By rotatably supporting the respective members 241 and 242 similar to the third member 233, the respective members 241 and 242 can rotate upward similar to the third member 233 shown in FIG. 11B to open the gate. As described above, the gate may include three or more members.

[0063] In the present embodiment, the transport path 30 is provided so as to be inclined, and a coin is transported in a state where the coin is shifted to the one side wall 30b. However, the configuration of the transport path 30 is not limited thereto, and the transport path 30 may be provided horizontally.

[0064] In the present embodiment, a plurality of members forming the gate close substantially the entire area of the opening formed in the transport surface of the transport path 30. However, a partial area of the opening may be closed as long as coins transported on the transport path 30 are not dropped into the opening when the gate is being closed. That is, a gap may be formed between the members in the closed position. For example, as shown in FIG. 2, in the case where the second member 12 has a shape in which the area, where the transport belt 40 and the transport pins 41 pass at the opened position, is cut out from the upstream side in the transport direction, the first member 11 has a shape to close at least a part of the cut-out area. Specifically, the shape of the claw 11a of the first member 11 shown in FIG. 2 may be a shape that is short in the X axis direction or thin in the Y axis direction.

[0065] The shape of each member forming the gate and movement of each member when opening and closing the gate are not particularly limited as long as coins on the transport path 30 are not dropped into the chute 160 when the gate is closed, and coins on the transport path 30 can be dropped into the chute 160 when the gate is opened. For example, for weight reduction, each member may have a mesh shape with through holes or may have a strip shape with long though holes. Alternatively, for example, a member that moves in parallel in the up-down direction may move upward from a closed position, at which the member forms a part of the transport surface of the transport path 30, to an opened position in order to prevent passage of a coin transported along the transport surface, thereby dropping the coin into the opening.

[0066] As described above, the coin handling apparatus according to claim 1 includes:

a transport path having a transport surface provided with an opening portion through which a coin is dropped; a transport unit configured to transport a coin on the transport surface along the transport path from upstream to downstream in a transport direction; a gate for opening and closing the opening portion of the transport surface, wherein the gate is configured to move between a first position in which the opening portion is closed by the gate and the coin transported by the transport unit is not dropped through the opening, and a second position in which the opening position is opened by the gate and the coin is dropped through the opening portion; and a driving unit configured to control the gate to move between the first position and the second position, wherein the gate includes a first member disposed upstream in the transport direction and a second member disposed downstream in the transport direction, upper surfaces of the first and second members form a flat surface being substantially flush w ith the transport surface of the transport path when the gate is i n the first position, and the driving unit is configured to drivet he first and second members to move the gate between the first position and the second position.

[0067] The plurality of members of the gate include a member configured to prevent passage of a coin transported on the transport surface and drop the coin into the opening, when the gate is in the opened position.

[0068] The gate is configured to form a flat surface that is substantially flush with the transport surface when the gate is in the closed position.

[0069] The plurality of members of the gate include: a first member disposed upstream in a transport direction of coins and configured to start rotating in a first direction from the closed position toward the opened position; and a second member disposed downstream in the transport direction and configured to start rotating in a second direction opposite to the first direction, from the closed position toward the opened position.

[0070] The first direction and the second direction are perpendicular to the transport surface.

[0071] The first member is configured to rotate around a first shaft disposed upstream in the transport direction within the opening, and the second member is configured to rotate around a second shaft disposed downstream in the transport direction within the opening.

[0072] The transport unit includes a transport pin configured to transport a coin on the transport surface by pushing the coin, and the second member has a shape in which an area, where the transport pin passes, when the gate is in the opened position, is cut out.

[0073] The first member has a shape to close at least a part of the cut-out area of the second member when the gate is in the closed position.

[0074] The coin handling apparatus includes a link mechanism configured to connect the first member and the second member such that the first member and the second member move in conjunction with each other when opening and closing the gate.

[0075] An angle by which the first member rotates from the closed position to the opened position is larger than an angle by which the second member rotates from the closed position to the opened position.

[0076] As described above, the coin handling apparatus has the openings formed in the transport path for coins, and dropping of a coin into each opening is controlled by opening and closing the gate including a plu-

rality of members. With the structure to close the opening by a plurality of members, each member can be reduced in weight and movement of each member for opening and closing the opening can be reduced, as compared to the case where one member closes the opening. Accordingly, even when coins are transported on the transport path at a high speed, only a coin to be dropped can be dropped into the opening.

[0077] At least a part of at least one of the members forming the gate is located above the transport surface when the gate is opened, thereby preventing passage of a coin transported thereto on the transport surface. The coin collides against the part located above the transport surface and is dropped, so that the coin can be reliably dropped into the opening.

[0078] As described above, the coin handling apparatus according to the present invention is useful for dropping only a coin to be dropped, into an opening formed in a transport path.

Claims

1. A coin handling apparatus (1) comprising:

a transport path (30) having a transport surface provided with an opening portion through which a coin is dropped;
a transport unit (150a) including a transport pin (41), wherein the transport unit (150a) is configured to transport a coin on the transport surface along the transport path (30) from upstream to downstream in a transport direction by pushing the coin with the transport pin (41);
a gate for opening and closing the opening portion of the transport surface, wherein the gate is configured to move between a first position in which the opening portion is closed by the gate and the coin transported by the transport unit (150a) is not dropped through the opening portion, and a second position in which the opening portion is opened by the gate and the coin is dropped through the opening portion; and
a driving unit configured to control the gate to move between the first position and the second position,
wherein the gate includes a first member (11) disposed upstream in the transport direction and a second member (12) disposed downstream in the transport direction,
the first member (11) is configured to rotate in a first direction when the gate moves from the first position to the second position, and the second member (12) is configured to rotate in a second direction opposite to the first direction when the gate moves from the first position to the second position,
upper surfaces of the first and second members (11,12) form a flat surface being substantially flush with the transport surface of the transport path when the gate is in the first position, and
the driving unit is configured to drive the first and sec ond members (11,12) to move the gate between the first position an d the second position
characterized in that
the coin handling apparatus further comprising:

a link structure configured to connect the first member (21) and the second member (22) such that movement of the first member (21) and the second member (22) is synchronized in a case that the gate opens and closes the opening portion of the transport surface, wherein
the second member (12) has a shape including an opening in an area where the transport pin (41) passes when the gate is in the second position, and the first member (11) has a shape that coincides with the opening of the second member (12) and prevents the coin from dropping into the opening in a case that the gate is in the first position.

2. The coin handling apparatus (1) according to claim 1, wherein the first and second members (11, 12) are configured to prevent passage of the coin transported on the transport surface and drop the transported coin through the opening portion when the gate is in the second position.

3. The coin handling apparatus (1) according to claim 1, wherein the first direction and the second direction are perpendicular to the transport surface.

4. The coin handling apparatus (1) according to any one of claims 1 to 3, wherein

the first member (11) is configured to rotate around an axis of a first shaft (11b) disposed upstream in the transport direction within the opening portion, and
the second member (12) is configured to rotate around an axis of a second shaft (12c) disposed downstream in the transport direction within the opening portion.

5. The coin handling apparatus (1) according to any one of claims 1 to 4, wherein
an angle by which the first member (21) rotates from the first position to the second position is larger than an angle by which the second member (22) rotates from the first position to the second position.

6. The coin handling apparatus of claim 1, wherein
the transport unit (150a) includes a transport belt (40)

that includes the transport pin (41) configured to push the coin along the transport path (30).

7. The coin handling apparatus of claim 1, wherein the second member (12) includes a pair of second claws (12a,12b), wherein a planar shape of the second member (12) as viewed above is a U-shape, and the pair of second claws (12a,12b), each of which has a substantially rectangular thin plate shape, extend parallel to each other upstream in the transport direction,

the first member (11) includes a first claw (11a) located between the pair of second claws (12a,12b) of the second members (12), wherein a planar shape of the first member (11) as viewed above is a T-shape, and the first claw (11a) having a substantially rectangular thin plate shape extends downstream in the transport direction,
in a transport path width direction, a gap (a) between the pair of second claws (12a,12b) is wider than a length (b) of the transport pin (41),
the first and second claws (11a,12a,12b) close substantially an entire area of the opening portion of the transport path when the gate is in the first position, and
the first claw (11a) moves to a lower side of the transport surface and the second claws (12a,12b) move to an upper side of the transport path when the gate is in the second position.

8. The coin handling apparatus of claim 1, wherein the transport direction of the transport path is a horizontal direction being perpendicular to a vertical direction.

9. The coin handling apparatus of claim 1, wherein the transport surface of the transport path is inclined against a vertical direction.

10. The coin handling apparatus of claim 1, wherein the transport path is provided with a plurality of chutes (160), and each chute (160) has a respective opening portion which is opened and closed by a respective gate.

11. The coin handling apparatus of claim 1, wherein the opening of the second member (12) is a cut-out area located on the upstream side in the transport direction of the second member (12).

Patentansprüche

1. Münzhandhabungsvorrichtung (1), aufweisend:

eine Transportbahn (30) mit einer Transportfläche, die mit einem Öffnungsabschnitt versehen ist, durch den eine Münze fallengelassen wird;
eine Transporteinheit (150a) mit einem Transportstift (41), wobei die Transporteinheit (150a) ausgestaltet ist, um eine Münze auf der Transportfläche durch Schieben der Münze mit dem Transportstift (41) entlang der Transportbahn (30) in einer Transportrichtung von stromaufwärts zu stromabwärts zu transportieren;
ein Tor zum Öffnen und Schließen des Öffnungsabschnitts der Transportfläche, wobei das Tor ausgestaltet ist, um sich zwischen einer ersten Stellung, in der der Öffnungsabschnitt durch das Tor geschlossen ist und die durch die Transporteinheit (150a) transportierte Münze nicht durch den Öffnungsabschnitt fallengelassen wird, und einer zweiten Stellung, in der der Öffnungsabschnitt durch das Tor geöffnet ist und die Münze durch den Öffnungsabschnitt fallengelassen wird, zu bewegen; und
eine Antriebseinheit, die konfiguriert ist, um das Tor zu steuern, um sich zwischen der ersten Stellung und der zweiten Stellung zu bewegen, wobei das Tor ein erstes Element (11), das in der Transportrichtung stromaufwärts angeordnet ist, und ein zweites Element (12), das in der Transportrichtung stromabwärts angeordnet ist, enthält,
das erste Element (11) ausgestaltet ist, um sich in einer ersten Richtung zu drehen, wenn sich das Tor von der ersten Stellung zur zweiten Stellung bewegt, und das zweite Element (12) ausgestaltet ist, um sich in einer zweiten Richtung entgegen der ersten Richtung zu drehen, wenn sich das Tor von der ersten Stellung zur zweiten Stellung bewegt,
obere Flächen des ersten und des zweiten Elements (11, 12) eine flache Fläche bilden, die im Wesentlichen bündig mit der Transportfläche der Transportbahn ist, wenn sich das Tor in der ersten Stellung befindet, und
die Antriebseinheit konfiguriert ist, um das erste und das zweite Element (11, 12) anzutreiben, um das Tor zwischen der ersten Stellung und der zweiten Stellung zu bewegen,
dadurch gekennzeichnet, dass
die Münzhandhabungsvorrichtung ferner aufweist:
eine Verbindungsstruktur, die ausgestaltet ist, um das erste Element (21) und das zweite Element (22) so zu verbinden, dass eine Bewegung des ersten Elements (21) und des zweiten Elements (22) in einem Fall synchronisiert wird, in dem das Tor den Öffnungsabschnitt der Transportfläche öffnet und schließt, wobei das zweite Element (12) eine Form mit einer Öffnung in einem Bereich hat, in dem der Transportstift (41) passiert, wenn das Tor in der zweiten Stellung

ist, und das erste Element (11) eine Form hat, die mit der Öffnung des zweiten Elements (12) in Einklang steht und in einem Fall, in dem das Tor in der ersten Stellung ist, verhindert, dass die Münze in die Öffnung fällt.

2. Münzhandhabungsvorrichtung (1) nach Anspruch 1, bei welcher das erste und das zweite Element (11, 12) ausgestaltet sind, um eine Passage der auf der Transportfläche transportierten Münze zu verhindern und die transportierte Münze durch den Öffnungsabschnitt fallenzulassen, wenn das Tor in der zweiten Stellung ist.

3. Münzhandhabungsvorrichtung (1) nach Anspruch 1, bei welcher die erste Richtung und die zweite Richtung senkrecht zur Transportoberfläche sind.

4. Münzhandhabungsvorrichtung (1) nach einem der Ansprüche 1 bis 3, bei welcher das erste Element (11) ausgestaltet ist, um sich um eine Achse einer ersten Welle (11b) zu drehen, die in der Transportrichtung stromaufwärts im Öffnungsabschnitt angeordnet ist, und
das zweite Element (12) ausgestaltet ist, um sich um eine Achse einer zweiten Welle (12c) zu drehen, die in der Transportrichtung stromabwärts im Öffnungsabschnitts angeordnet ist.

5. Münzhandhabungsvorrichtung (1) nach einem der Ansprüche 1 bis 4, bei welcher ein Winkel, um den sich das erste Element (21) von der ersten Stellung zur zweiten Stellung dreht, größer ist als ein Winkel, um den sich das zweite Element (22) von der ersten Stellung zur zweiten Stellung dreht.

6. Münzhandhabungsvorrichtung nach Anspruch 1, bei welcher die Transporteinheit (150a) einen Transportriemen (40) enthält, der den Transportstift (41) enthält, der ausgestaltet ist, um die Münze entlang der Transportbahn (30) zu schieben.

7. Münzhandhabungsvorrichtung nach Anspruch 1, bei welcher das zweite Element (12) ein Paar von zweiten Klauen (12a, 12b) enthält, wobei eine plane Form des zweiten Elements (12) von oben betrachtet eine U-Form ist, und das Paar von zweiten Klauen (12a, 12b), von denen jede eine im Wesentlichen rechteckige dünne Plattenform hat, in der Transportrichtung stromaufwärts parallel zueinander verlaufen,

das erste Element (11) eine erste Klaue (11a) enthält, die zwischen dem Paar von zweiten Klauen (12a, 12b) des zweiten Elements (12) angeordnet ist, wobei eine plane Form des ersten Elements (11) von oben betrachtet eine T-Form ist, und die erste Klaue (11a) mit einer im Wesentlichen rechteckigen dünnen Plattenform in der Transportrichtung stromabwärts verläuft, in einer Transportbahn-Breitenrichtung ein Spalt (a) zwischen dem Paar von zweiten Klauen (12a, 12b) breiter ist als eine Länge (b) des Transportstifts (41), die ersten und zweiten Klauen (11a, 12a, 12b) im Wesentlichen einen gesamten Bereich des Öffnungsabschnitts der Transportbahn schließen, wenn das Tor in der ersten Stellung ist, und
die erste Klaue (11a) sich zu einer Unterseite der Transportfläche bewegt und die zweiten Klauen (12a, 12b) sich zu einer Oberseite der Transportbahn bewegen, wenn das Tor in der zweiten Stellung ist.

8. Münzhandhabungsvorrichtung nach Anspruch 1, bei welcher die Transportrichtung der Transportbahn eine horizontale Richtung senkrecht zu einer vertikalen Richtung ist.

9. Münzhandhabungsvorrichtung nach Anspruch 1, bei welcher die Transportfläche der Transportbahn gegen eine vertikale Richtung geneigt ist.

10. Münzhandhabungsvorrichtung nach Anspruch 1, bei welcher die Transportbahn mit mehreren Rutschbahnen (160) versehen ist und jede Rutschbahn (160) einen jeweiligen Öffnungsabschnitt hat, der durch ein jeweiliges Tor geöffnet und geschlossen wird.

11. Münzhandhabungsvorrichtung nach Anspruch 1, bei welcher die Öffnung des zweiten Elements (12) ein ausgeschnittener Bereich ist, der in der Transportrichtung auf der stromaufwärtigen Seite des zweiten Elements (12) angeordnet ist.

Revendications

1. Appareil de manipulation de pièces de monnaie (1) comprenant :

un chemin de transport (30) ayant une surface de transport pourvue d'une portion d'ouverture à travers laquelle une pièce de monnaie tombe ;
une unité de transport (150a) incluant une tige de transport (41), dans lequel l'unité de transport (150a) est configurée pour transporter une pièce de monnaie sur la surface de transport le long du chemin de transport (30) d'amont en aval dans le sens de transport, en poussant la pièce de monnaie avec la tige de transport (41) ;
une porte pour ouvrir et fermer la portion d'ouverture de la surface de transport, dans lequel la porte est configurée pour se déplacer entre une première position dans laquelle la por-

tion d'ouverture est fermée par la porte et la pièce de monnaie transportée par l'unité de transport (150a) ne tombe pas à travers la portion d'ouverture, et une deuxième position dans laquelle la portion d'ouverture est ouverte par la porte et la pièce de monnaie tombe à travers la portion d'ouverture ; et
une unité d'entraînement qui est configurée pour contrôler le déplacement de la porte entre la première position et la deuxième position,
dans lequel la porte inclut un premier membre (11) qui est disposé en amont dans la sens de transport, et un deuxième membre (12) qui est disposé en aval dans le sens de transport,
dans lequel le premier membre (11) est configuré pour tourner dans une première direction lorsque la porte se déplace de la première position à la deuxième position, et le deuxième membre (12) est configuré pour tourner dans une deuxième direction opposée à la première direction lorsque la porte se déplace de la première position à la deuxième position,
dans lequel des surfaces supérieures des premier et deuxième membres (11, 12) forment une surface plate qui affleure sensiblement la surface de transport du chemin de transport lorsque la porte est dans la première position, et
dans lequel l'unité d'entraînement est configurée pour entraîner les premier et deuxième membres (11, 12) pour qu'ils déplacent la porte entre la première position et la deuxième position,
caractérisé en ce que
l'appareil de manipulation de pièces de monnaie comprend en outre :

une structure de liaison qui est configurée pour relier le premier membre (11) et le deuxième membre (12) de telle sorte que le déplacement du premier membre (21) et du deuxième membre (22) soit synchronisé dans le cas où la porte ouvre et ferme la portion d'ouverture de la surface de transport, dans lequel
le deuxième membre (12) a une forme incluant une ouverture dans une zone où la tige de transport (41) passe lorsque la porte est dans la deuxième position, et le premier membre (11) a une forme qui coïncide avec l'ouverture du deuxième membre (12) et qui empêche la pièce de monnaie de tomber dans l'ouverture dans le cas où la porte est dans la première position.

2. Appareil de manipulation de pièces de monnaie (1) selon la revendication 1, dans lequel les premier et deuxième membres (11, 12) sont configurés pour empêcher le passage de la pièce de monnaie transportée sur la surface de transport, et pour faire tomber la pièce de monnaie transportée à travers la portion d'ouverture lorsque la porte est dans la deuxième position.

3. Appareil de manipulation de pièces de monnaie (1) selon la revendication 1, dans lequel la première direction et la deuxième direction sont perpendiculaires à la surface de transport.

4. Appareil de manipulation de pièces de monnaie (1) selon l'une quelconque des revendications 1 à 3, dans lequel :

le premier membre (11) est configuré pour tourner autour d'un axe d'un premier arbre (11b) qui est disposé en amont dans le sens de transport à l'intérieur de la portion d'ouverture, et
le deuxième membre (12) est configuré pour tourner autour d'un axe d'un deuxième arbre (12c) qui est disposé en aval dans le sens de transport à l'intérieur de la portion d'ouverture.

5. Appareil de manipulation de pièces de monnaie (1) selon l'une quelconque des revendications 1 à 4, dans lequel :
un angle dont le premier membre (21) tourne de la première position à la deuxième position est supérieur à un angle dont le deuxième membre (22) tourne de la première position à la deuxième position.

6. Appareil de manipulation de pièces de monnaie selon la revendication 1, dans lequel :
l'unité de transport (150a) inclut une courroie de transport (40) qui inclut la tige de transport (41) qui est configurée pour pousser la pièce de monnaie le long du chemin de transport (30).

7. Appareil de manipulation de pièces de monnaie selon la revendication 1, dans lequel :

le deuxième membre (12) inclut une paire de deuxièmes pinces (12a, 12b), dans lequel une forme plane du deuxième membre (12) en vue de dessus est une forme en U, et la paire de deuxièmes pinces (12a, 12b), dont chacune a une forme sensiblement plate, mince et rectangulaire, s'étend en amont dans le sens de transport avec les deuxièmes pinces étant parallèles entre elles,
le premier membre (11) inclut une première pince (11a) qui est située entre la paire de deuxièmes pinces (12a, 12b) des deuxièmes membres (12), dans lequel une forme plane du premier membre (11) en vue de dessus est une forme en T, et la première pince (11a) ayant une forme sensiblement plate, mince et rectangulaire s'étend en aval dans le sens de transport,

dans le sens de la largeur du chemin de transport, un intervalle (a) entre la paire de deuxièmes pinces (12a, 12b) est plus large qu'une longueur (b) de la tige de transport (41),
les première et deuxième pinces (11a, 12a, 12b) ferme sensiblement une zone entière de la portion d'ouverture du chemin de transport lorsque la porte est dans la première position, et
la première pince (11a) se déplace vers un côté inférieur de la surface de transport, et les deuxièmes pinces (12a, 12b) se déplacent vers un côté supérieur du chemin de transport lorsque la porte est dans la deuxième position.

8. Appareil de manipulation de pièces de monnaie selon la revendication 1, dans lequel le sens de transport du chemin de transport a une direction horizontale perpendiculaire à une direction verticale.

9. Appareil de manipulation de pièces de monnaie selon la revendication 1, dans lequel la surface de transport du chemin de transport est inclinée par rapport à une direction verticale.

10. Appareil de manipulation de pièces de monnaie selon la revendication 1, dans lequel le chemin de transport est pourvu d'une pluralité de glissières (160), et chaque glissière (160) a une portion d'ouverture respective qui est ouverte et fermée par une porte respective.

11. Appareil de manipulation de pièces de monnaie selon la revendication 1, dans lequel l'ouverture du deuxième membre (12) est une zone découpée qui est située sur le côté amont dans le sens de transport du deuxième membre (12).

FIG.1A

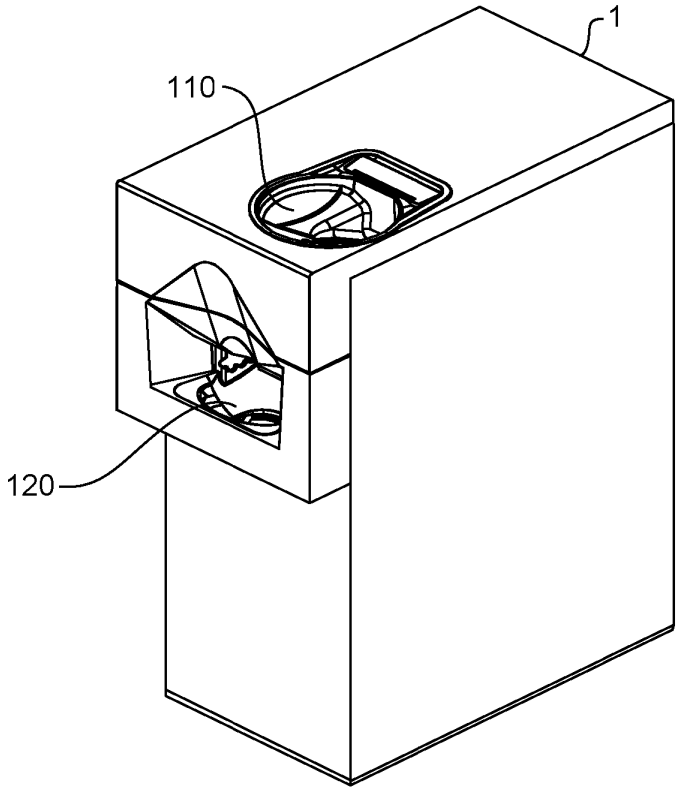

1
110
120

FIG.1B

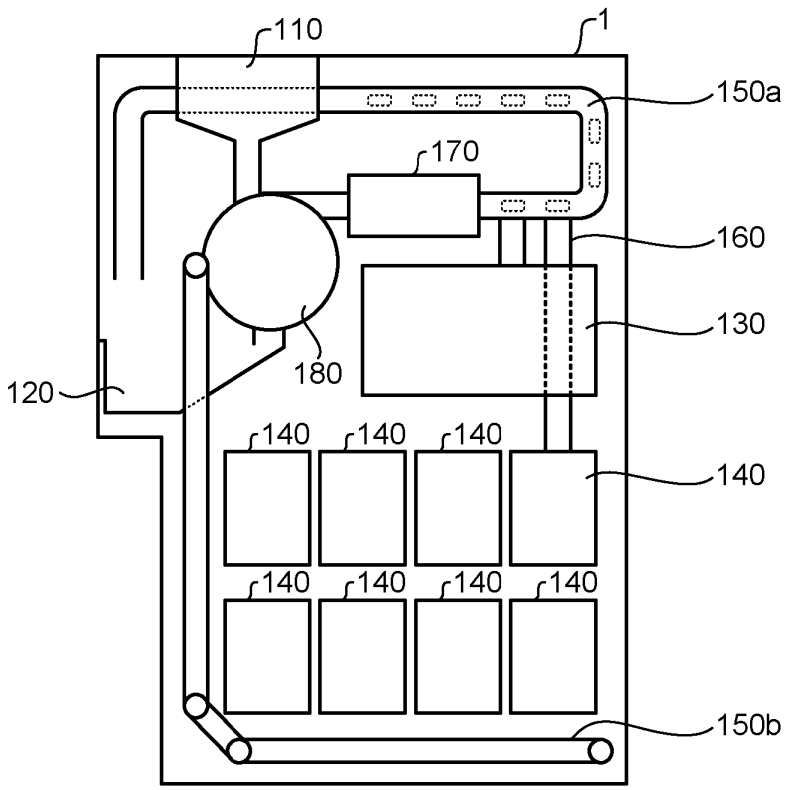

110
1
150a
170
160
130
180
120
140
140
140
140
140
140
140
140
150b

FIG.2

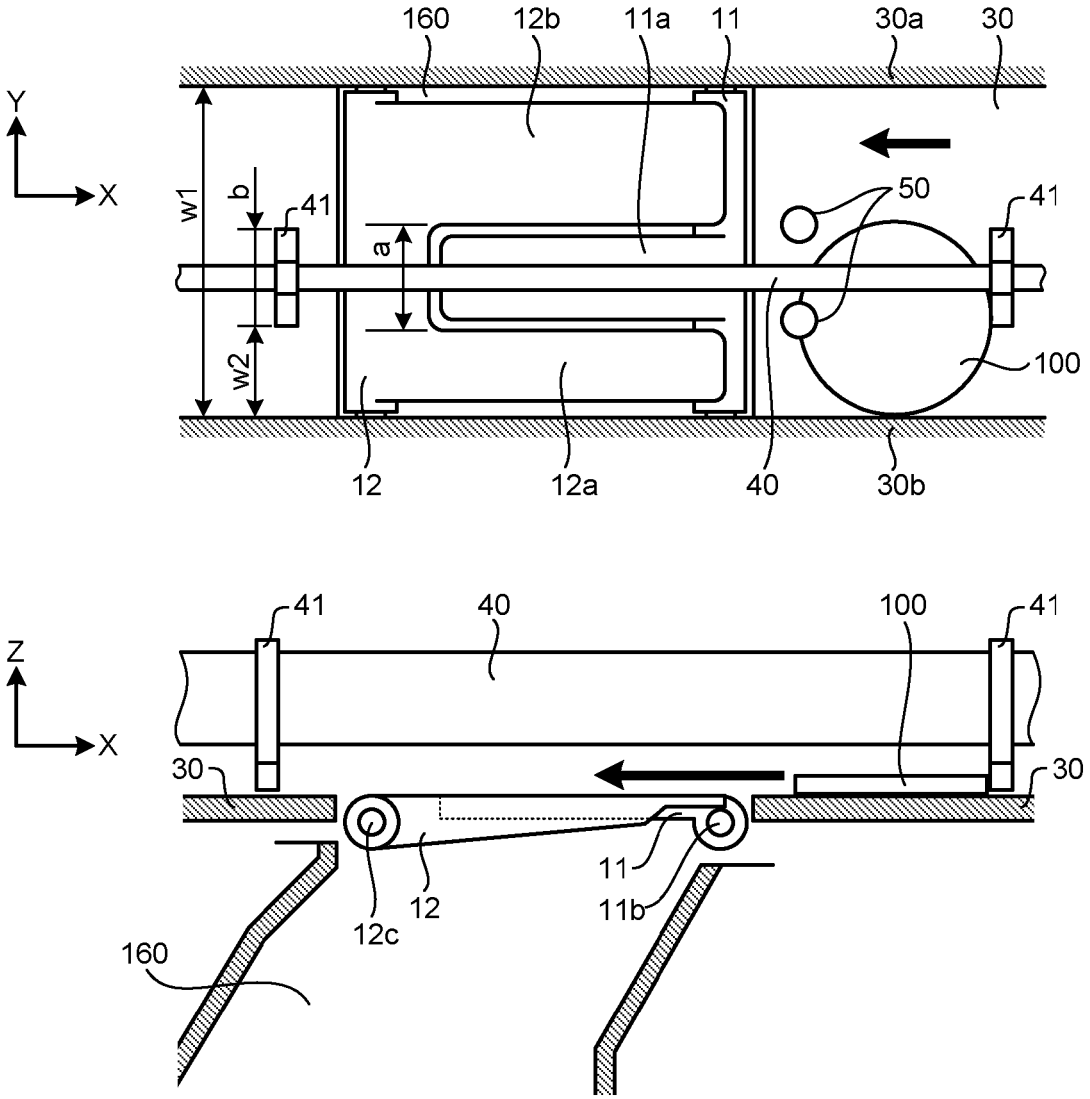

160
12b
11a
11
30a
30
Y
X
w1
b
41
a
w2
50
41
100
12
12a
40
30b
41
40
100
41
Z
X
30
30
11
11b
12
12c
160

FIG.3

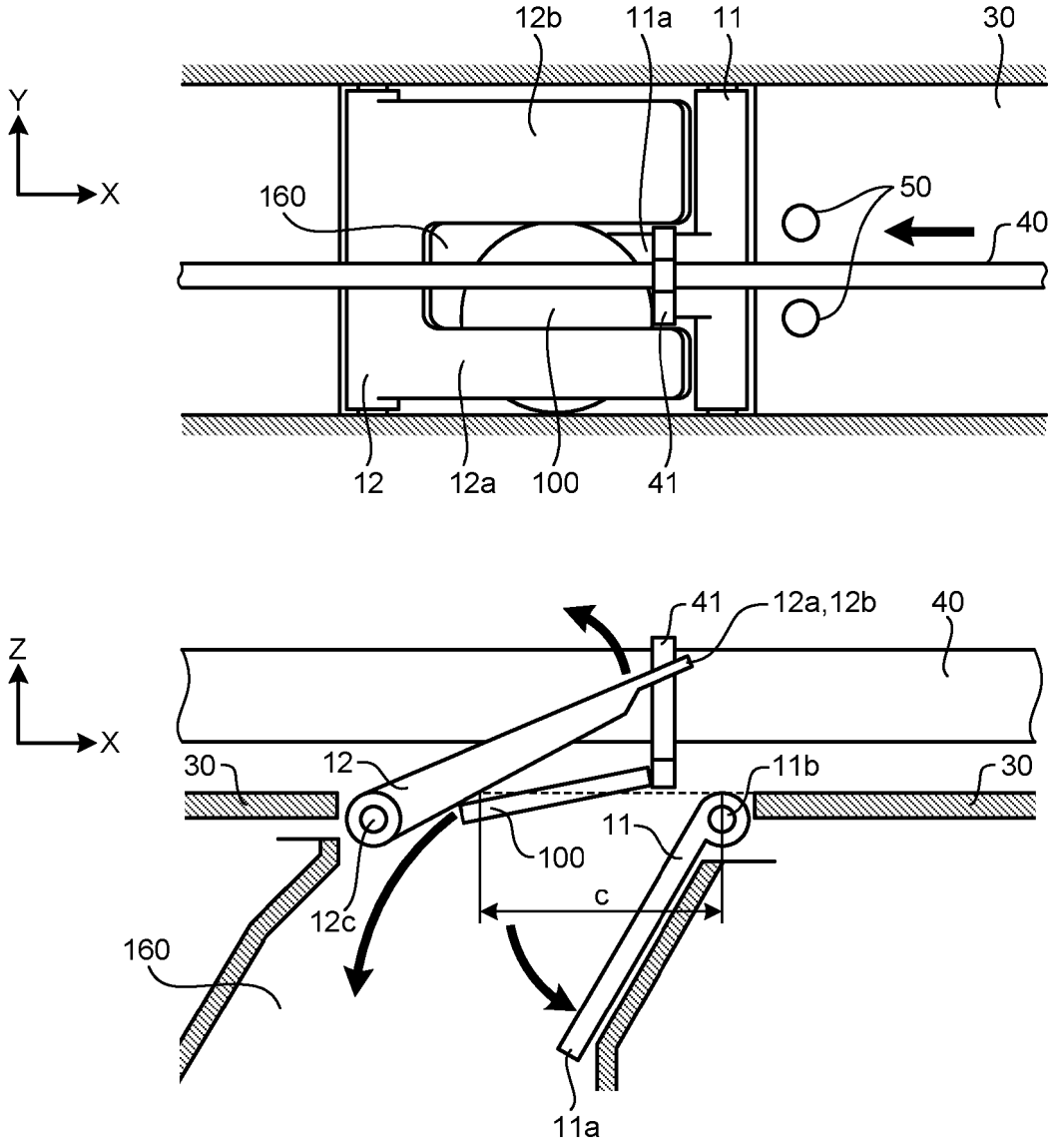

12b
11a
11
30
Y
X
160
50
40
12
12a
100
41
Z
X
41
12a,12b
40
30
12
11b
30
11
100
c
12c
160
11a

FIG.4

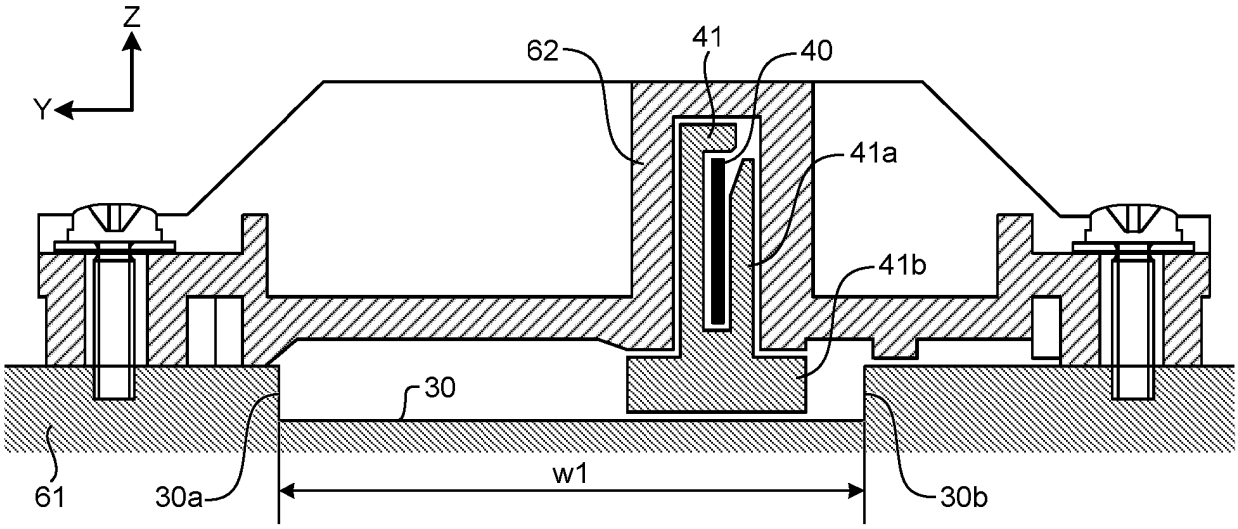


FIG.5A

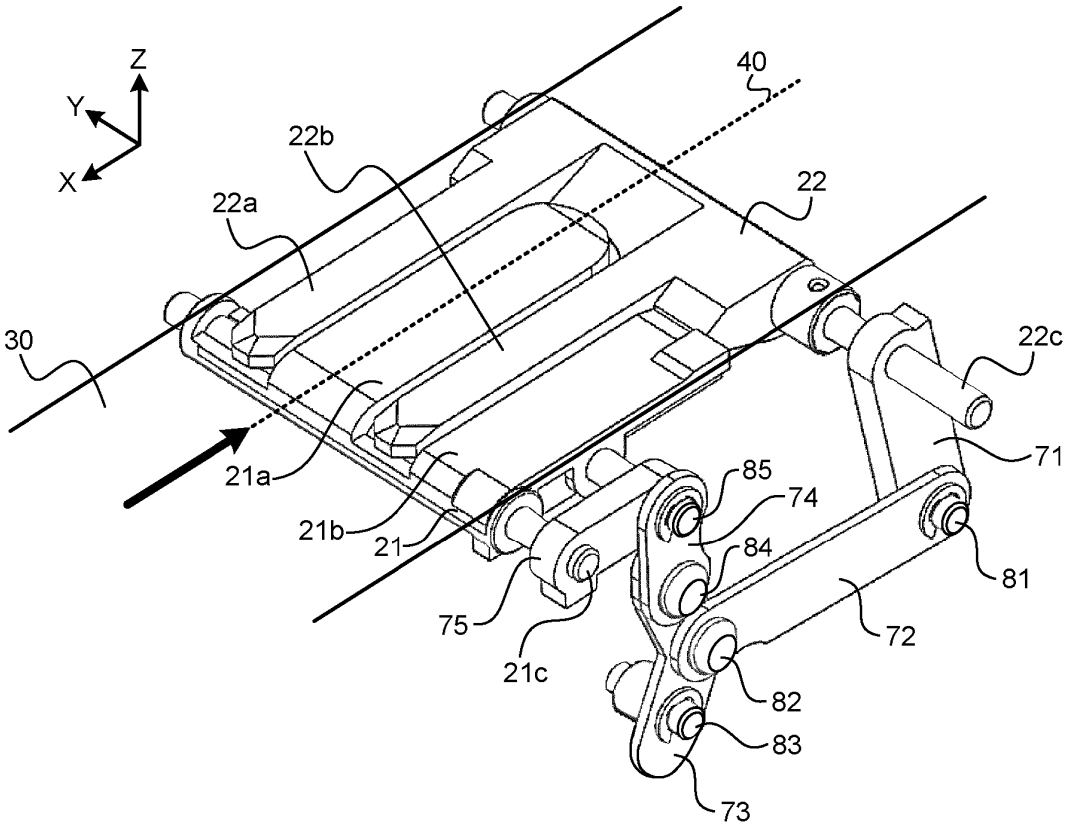

Z
Y
X
40
22b
22a
22
30
22c
71
21a
85
74
21b
21
84
81
75
72
21c
82
83
73

FIG.5B

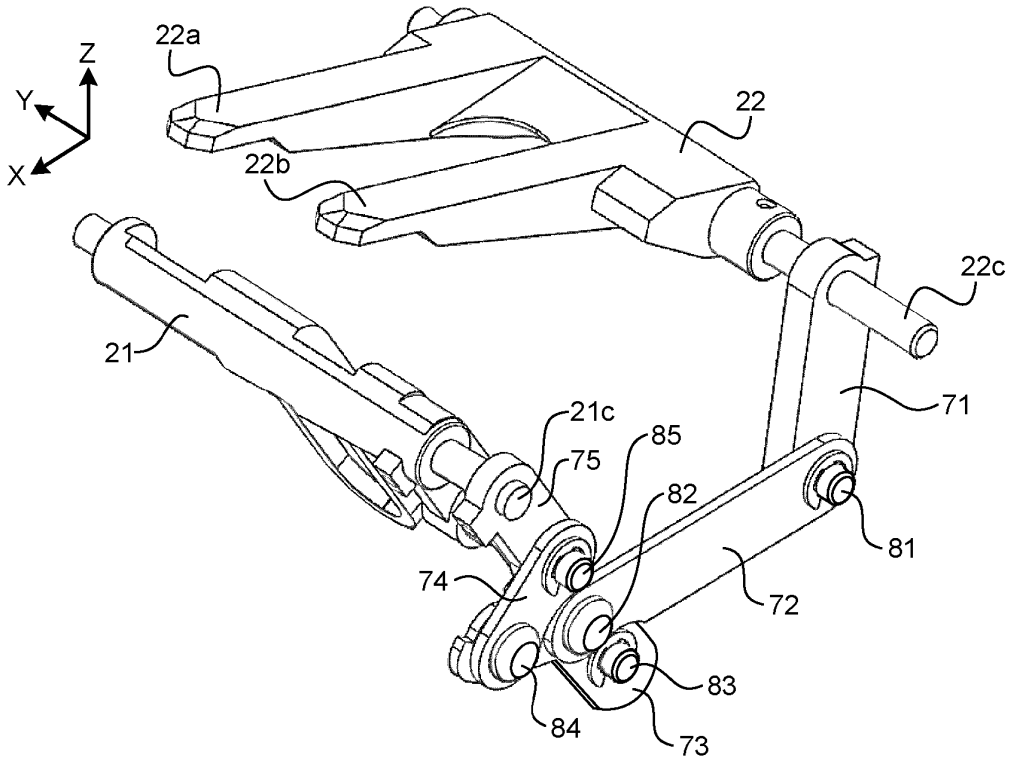

Z
Y
X
22a
22
22b
22c
21
71
21c
85
75
82
81
74
72
83
84
73

FIG.6A

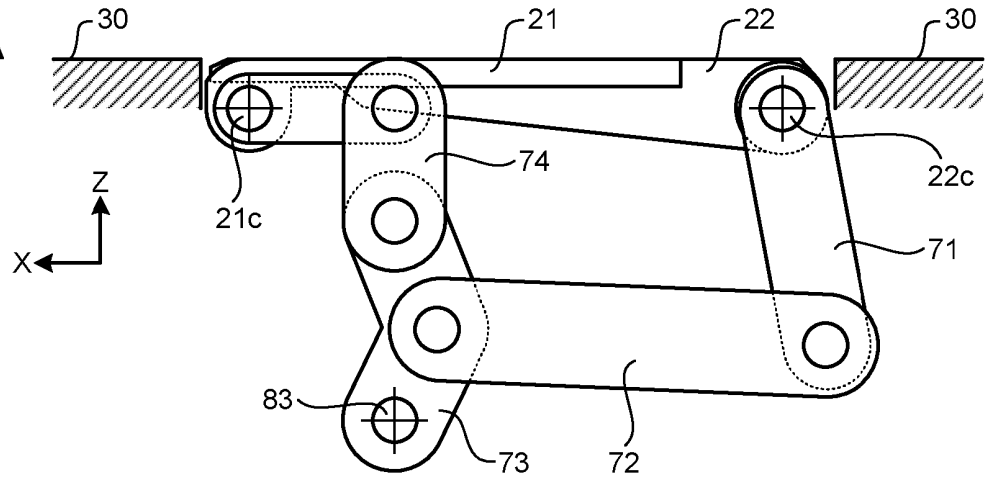


FIG.6B

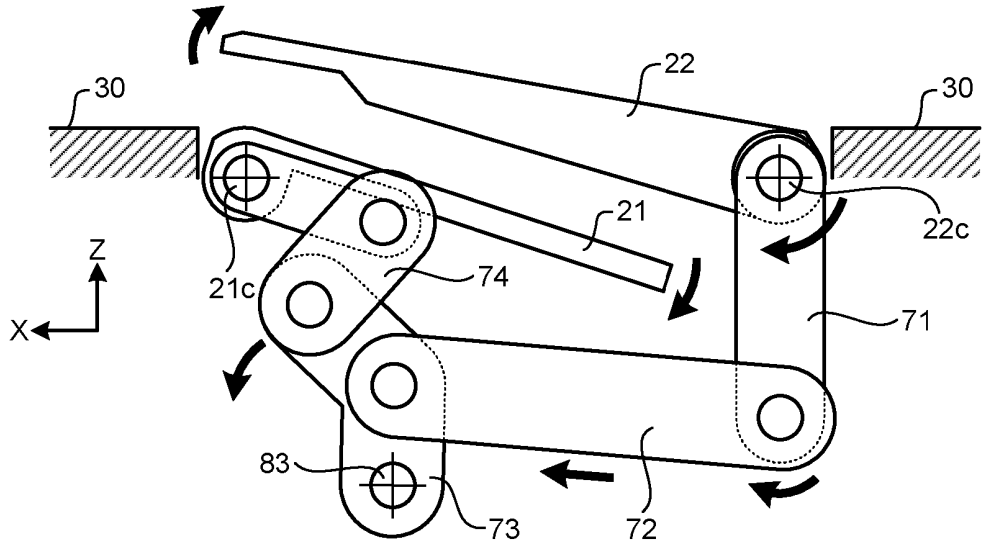


FIG.6C

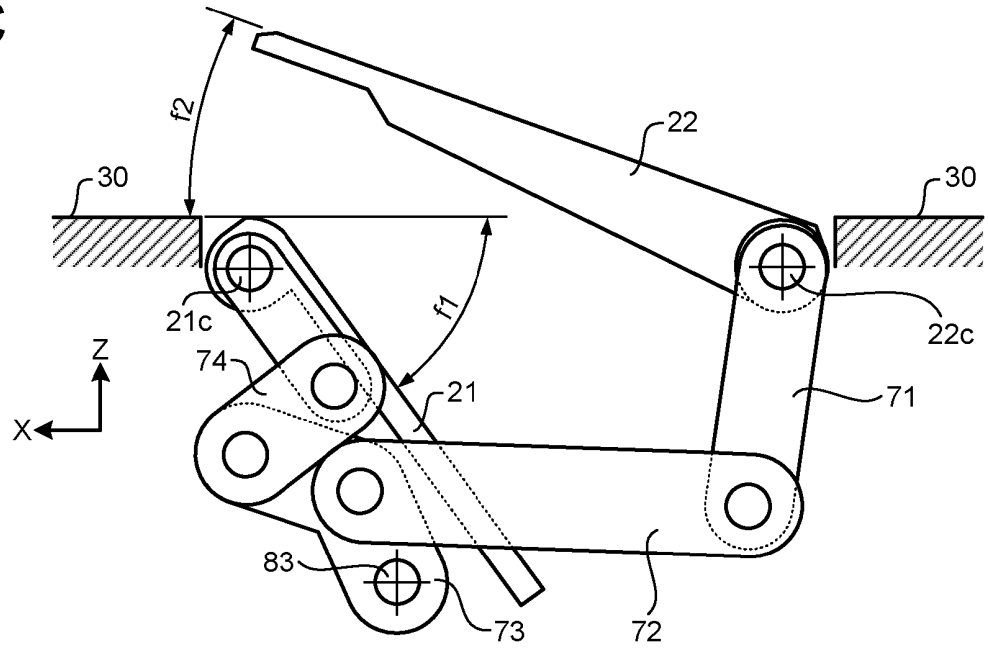


FIG.7A

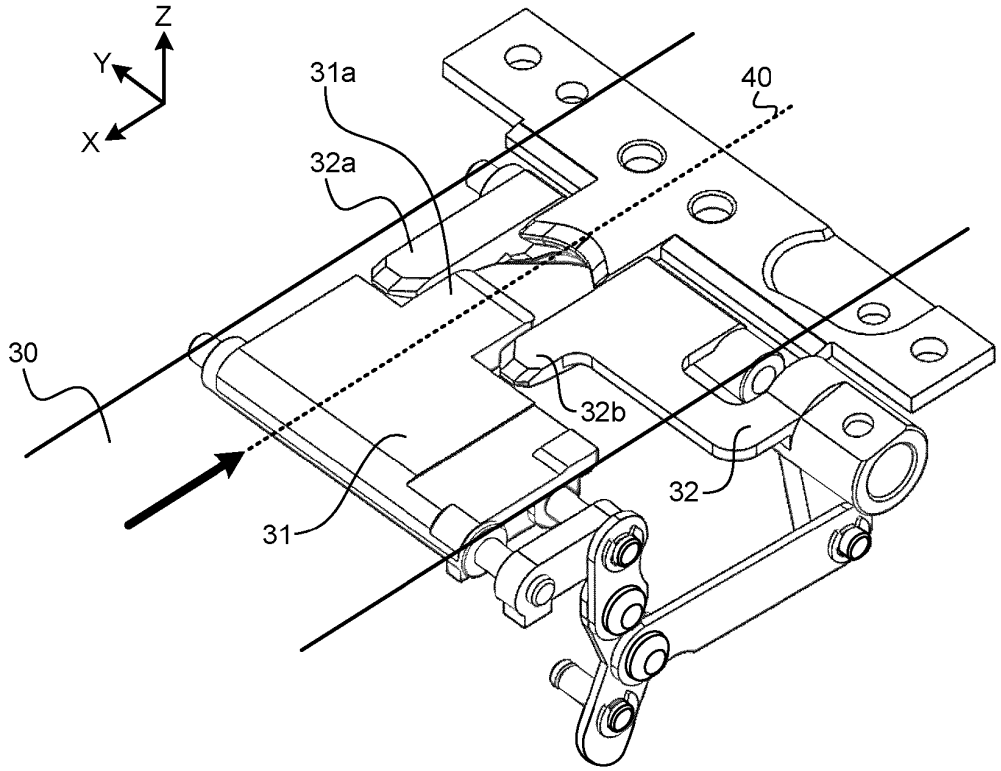


FIG.7B

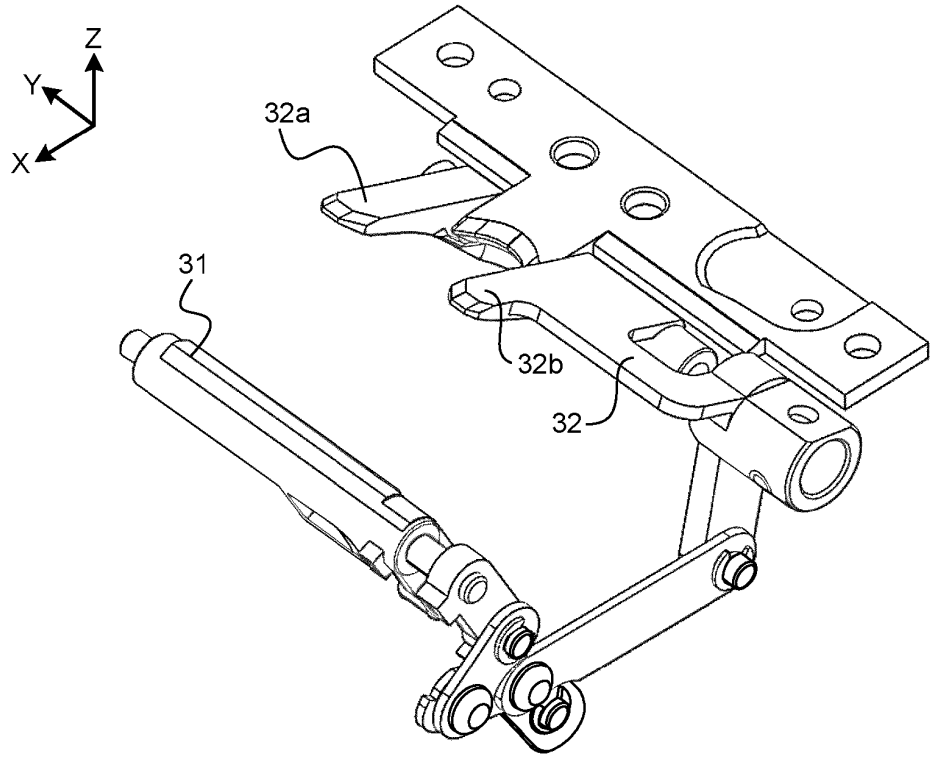


FIG.8A

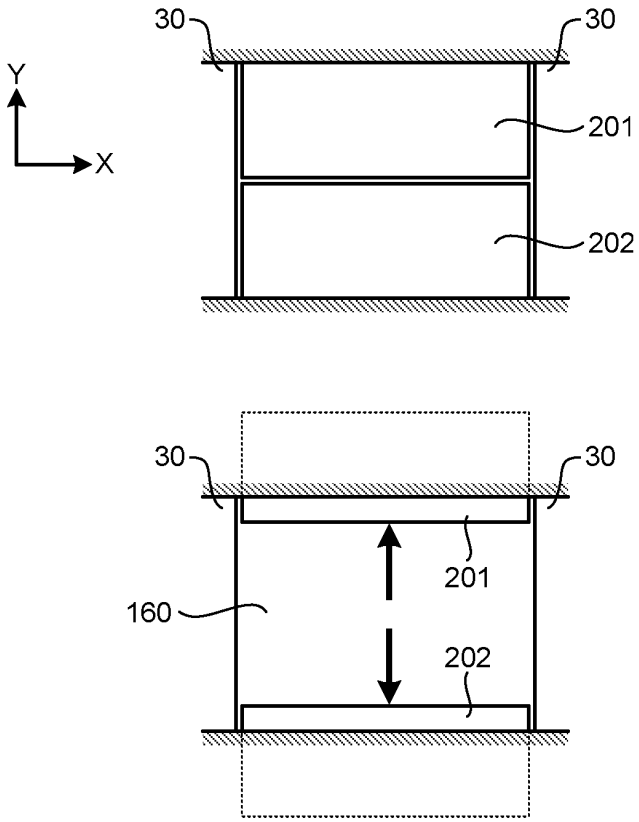

30
30
Y
X
201
202
30
30
201
160
202

FIG.8B

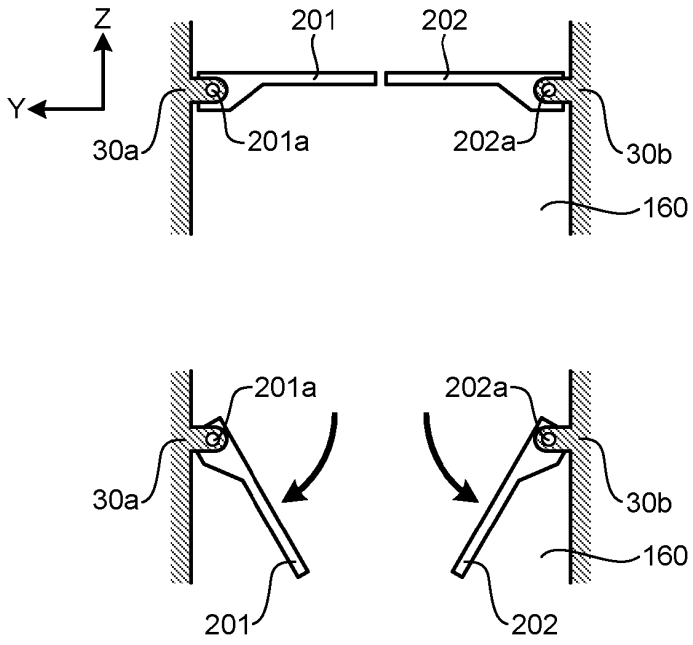

Z
Y
201
202
30a
201a
202a
30b
160
201a
202a
30a
30b
160
201
202

FIG.9

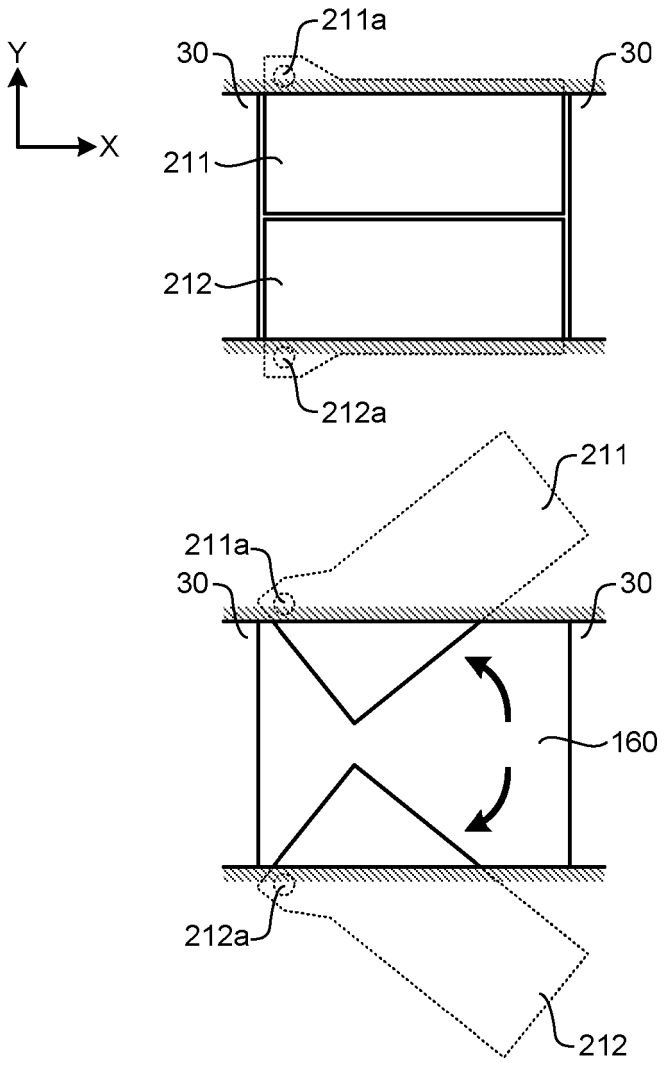


FIG.10A

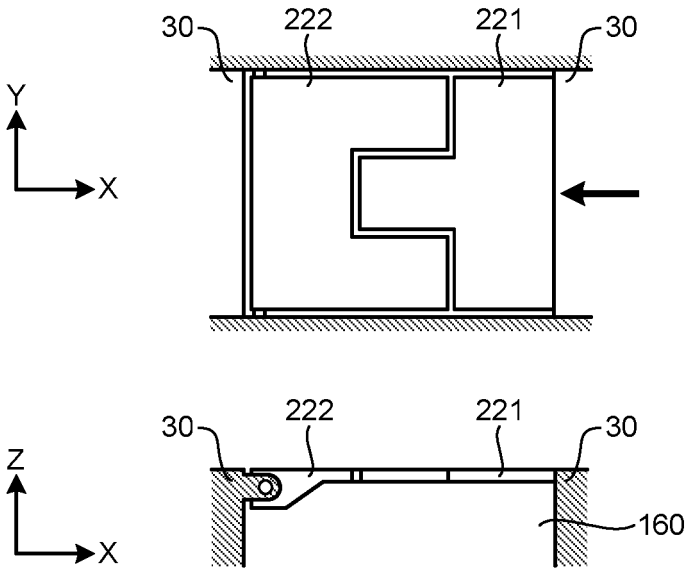


FIG.10B

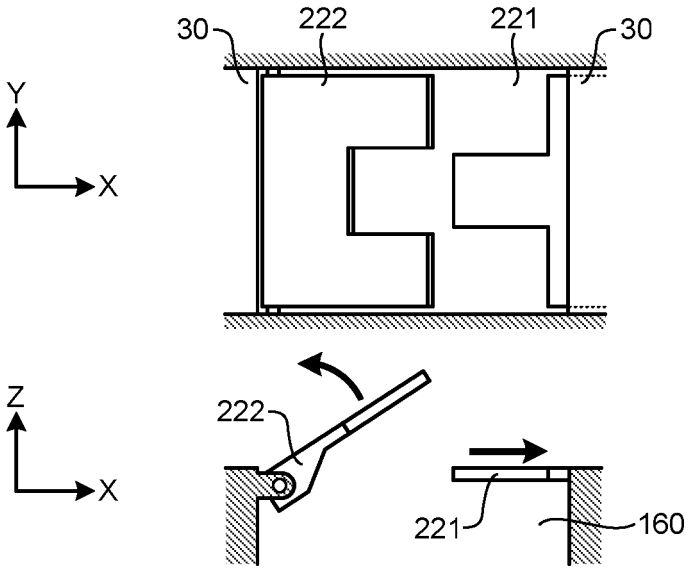


FIG.11A

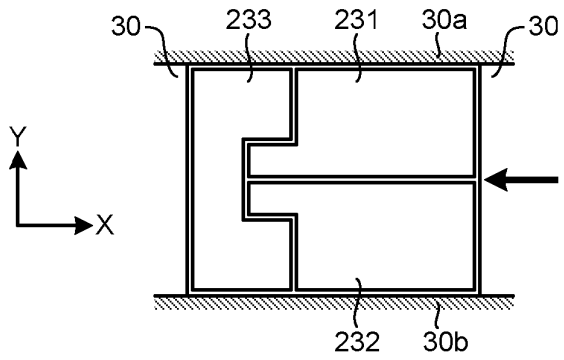


FIG.11B

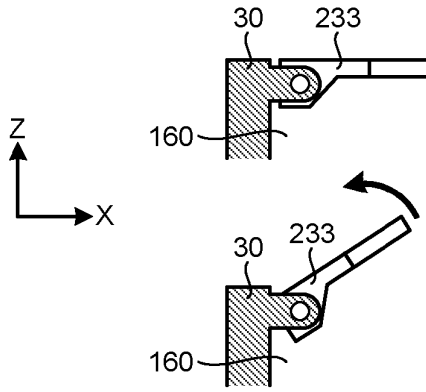


FIG.11C

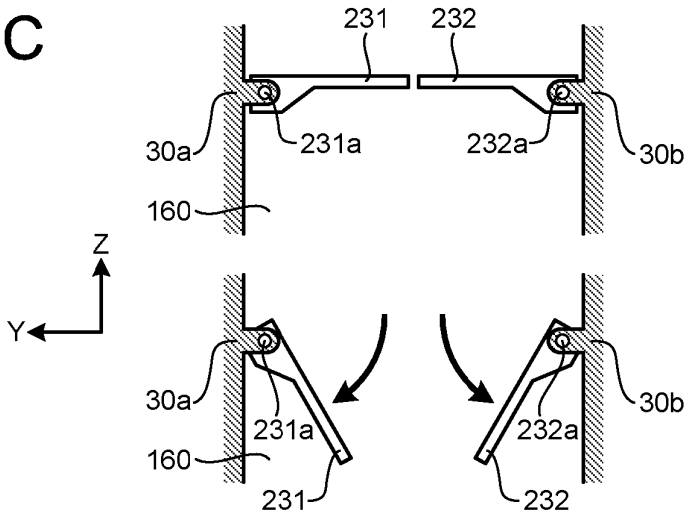
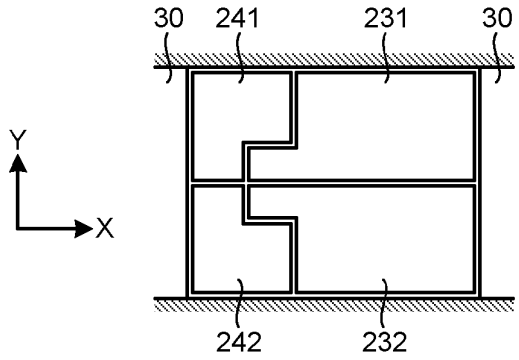


FIG.11D



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